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GEOCHEMISTRY.—*Note on the water of Borax Lake.*[1] ROGER C. WELLS, U. S. Geological Survey.

Borax Lake is of interest, being the first locality in the United States at which borax was produced commercially. It is a broad, shallow lake, seldom over a few feet deep, situated east of the narrow arm of Clear Lake in Lake County, California. It has been described by J. A. Veatch, J. D. Whitney, G. F. Becker, J. A. Philipps, and others.[2]

Borax was first noted in the water by J. A. Veatch in 1856 and shortly afterwards a bed of borax crystals was found in the mud in the bottom of the lake which was worked for borax by means of movable coffer-dams. The water of the lake in September, 1863, contained 41.1 grams of solids to the liter, according to an analysis by G. E. Moore, quoted by Whitney, and of this about 4.8 grams is anhydrous borax. Melville's elaborate analysis published in Becker's monograph on the quicksilver deposits of the Pacific slope shows total solids of about 76.6, of which 5 grams per liter is borax. (This sample was probably collected in 1887.)

In August, 1921, Hoyt S. Gale collected a sample of water from the lake and very kindly forwarded it to the writer for study with the suggestion that a comparison of the present borax content with previous determinations would be interesting. The material thus presented was welcomed as being also suitable for the study of the alkalinity and hydrogen ion concentration, the latter being a physical property of alkali lake waters that has not yet been widely studied.

The total solids obtained on evaporation and drying at 180° C. amounted to 32.0 grams per liter. The water is therefore now more dilute than the early samples mentioned above. This is perhaps not

[1] Published by permission of the Director of the United States Geological Survey. Received October 21, 1921.

[2] For references see bibliography by H. S. GALE, U. S. Geol. Survey Mineral Resources, 1913: Pt. II, p. 523.

surprising as it is said that in 1861 the lake dried up entirely. The proportions of the principal salts appear to have changed somewhat since 1863 as shown by the following percentages:

	NaCl	Na_2CO_3	$Na_2B_4O_7$
1863	50	25	12.
1887	53	40	6.6
1921	60	33	7.3

The figures for 1863 give the approximate composition stated by Whitney from Moore's analysis.[3] The statement is incomplete and the borax determination is open to question, but may be of the right order. The figures for 1887 and 1921 are calculated from Cl, total CO_2, and B_2O_3 and are therefore somewhat arbitrary inasmuch as bicarbonates and metaborates are neglected. The latter are evaluated as shown below. Since 1887 there appears to have been a slight gain in borax and sodium chloride and a loss in sodium carbonate. In the 1921 sample the Cl found was 11.6; SO_4, 0.05; Ca, 0.06; Mg, 0.07; CO_2, 4.90; B_2O_3, 1.62; K, 0.56 grams per liter. The titration alkalinity to methyl orange was 0.214 normal.

The alkaline character of the water may be expressed through the hydrogen ion concentration as $p_H = 9.75$. This measurement was made electrometrically, as described elsewhere.[4] The water is actually somewhat more alkaline than the Searles lake brine (for which $p_H = 9.48$) although it is far less concentrated in total salts. This peculiarity is caused by the large salt effect in Searles brine.

In order to represent the dissolved alkaline matter in the form of the customary buffer salts, as has been done for Searles brine,[5] an artificial water, containing 18.5 g. sodium chloride, 0.5 g. magnesium chloride, 1.0 g. potassium chloride, and 0.03 g. calcium sulfate per liter was made up as a medium to which buffer salts could be added and the resulting p_H values determined. A set of p_H determinations was then made with various proportions of sodium carbonate and bicarbonate, keeping the total CO_2 equal to that found in the lake water. Another similar set was made with mixtures of borax and sodium metaborate keeping the total B_2O_3 the same as found in the lake water. The results are given in table 1 and plotted in figure 1.

[3] Calif. Geol. Surv. **1**: 98.

[4] Journ. Amer. Chem. Soc. **42**: 2160. 1920. For general directions, CLARK, *The determination of hydrogen ions.*

[5] Journ. Eng. Chem. **13**: 691. 1921.

The curves shown in the figure are drawn to pass through the observational data and also approximately parallel to the curves for the corresponding buffer mixtures in pure water.[6] The effect

TABLE 1

RESULTS OF p_H DETERMINATIONS MADE AFTER ADDING CARBONATE AND BORATE BUFFERS TO AN ARTIFICIAL LAKE WATER. TOTAL $CO_2 = 4.26$ G. PER LITER. TOTAL $B_2O_3 = 1.62$ G. PER LITER

Percentage total CO_2 present as Na_2CO_3	p_H	Percentage of total B_2O_3 present as $Na_2B_2O_4$	p_H
20	9.07	50	9.42
50	9.63	70	9.74
75	10.10	80	9.95
95	10.78	90	10.27

of the salt in Borax Lake water seems to be about 45 and 75 per cent of that in Searles Lake brine in decreasing the p_H values for the car-

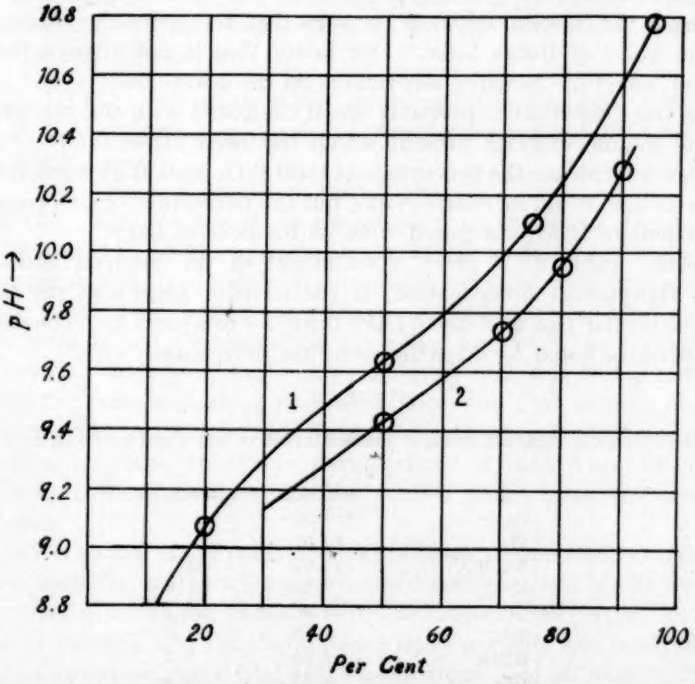

Fig. 1. p_H for mixtures of $NaHCO_3$ and Na_2CO_3, and of $Na_2B_4O_7$ and $Na_2B_2O_4$ in an artificial brine resembling Borax Lake water. Curve 1: per cent of total CO_2 present as Na_2CO_3 (balance $NaHCO_3$). Curve 2: per cent total B_2O_3 present as $Na_2B_2O_4$ (balance $Na_2B_4O_7$).

[6] Data given in PRIDEAUX, *The theory and use of indicators*, pp. 279 and 299.

bonate and borate buffers, respectively. The addition of salt makes the buffer solutions more acid. Until more measurements on the salt effect are obtained each case must be studied by itself, although it is evident that the salt effect increases only slowly with increasing concentrations of salt.

From the curves it is easily seen that in order to yield the value $p_H = 9.75$ the CO_2 and B_2O_3 should be distributed as follows in the respective salts:

CO_2 { 57 per cent as Na_2CO_3 / 43 per cent as $NaHCO_3$ } B_2O_3 { 71 per cent as $Na_2B_2O_4$ / 29 per cent as $Na_2B_4O_7$ }

or, as grams per liter:

Na_2CO_3 5.9	$Na_2B_2O_4$ 2.17
$NaHCO_3$ 3.5	$Na_2B_4O_7$ .68

It is concluded that the proportions last given approximately represent the concentrations of the salts that determine the alkalinity of the water of Borax Lake. One factor that is not allowed for is the salt effect of the carbonate buffers on the borate buffers, and vice versa, but this effect is probably small compared with the salt effect of the sodium chloride present which has been allowed for. By a strange coincidence the percentage of total B_2O_3 present as borax is the same as that found for Searles Lake, but the percentage of CO_2 present as carbonate is 57, compared with 78 for Searles Lake.

Below (Table 2) is given a statement of the analysis deduced from the present investigation, in the form of gram ions per liter, with a similar one of Searles Lake brine for comparison. The minor constituents noted by Melville were not determined.

TABLE 2

ANALYSES DEDUCED FROM THE PRESENT INVESTIGATION IN THE FORM OF GRAM IONS PER LITER

	Borax Lake	Searles Lake
Ca	.06	.....
Mg	.07	.....
Na (diff.)	11.42	143.7
K	.56	31.9
Cl	11.60	159.2
SO_4	.05	61.0
HCO_3	2.54	7.2
CO_3	3.34	25.4
B_4O_7	.52	4.3
B_2O_4	1.42	11.8
	31.58	444.5

Borax crystals remain in the mud of Borax Lake although the water is not now saturated with borax. It is not unusual to find certain crystallized salts in the bottom mud of a lake containing water that is not saturated with those salts. Water from the bottom mud and lower is also frequently more concentrated than the lake water. Such relations have been noted in the Wyoming lakes carrying sodium sulfate, in the Nebraska lakes carrying potassium salts, and in the Great Salt Lake, where Glauber's salt has been found below sand and clay. The explanation probably is that in the coldest or driest weather crystals are deposited and fall to the bottom where they become covered with silt and clay. The reverse process of solution, being chiefly dependent on diffusion, is too slow to occur in the alternate warm or wet seasons or even in several such seasons. Certain salt deposits may therefore owe their origin in some cases to extreme or unusual conditions rather than to average conditions, provided they become silted over.

PETROLOGY.—*Obsidian from Copan and Chichen Itza.*[1] HENRY S. WASHINGTON, Geophysical Laboratory, Carnegie Institution of Washington.

OBSIDIAN FROM COPAN

In 1920, during his study of the Maya ruins at Copan, Honduras, Dr. Sylvanus G. Morley obtained a number of obsidian cores, that is, the remnants of rock nodules from which knives and other implements had been flaked off by the ancient Maya. Dr. Morley very kindly gave these cores to me for examination, a courtesy for which I would express my thanks. It appears that many such cores are found by the natives among the ruins and along the valley floor, and that nodules of obsidian are said to occur in the tuffs of the neighborhood. As such cores, valueless in Copan, would scarcely be articles of trade, it may be safely assumed that the obsidian of those studied comes from the vicinity of Copan.

Little is known of the volcanic rocks of Central America. Obsidian, dacite, andesite, and basalt are mentioned and described briefly by the few petrologists who have dealt with the subject, but (except for the rocks of Panama and the Canal Zone) there are only five analyses of Central American rocks, and only one of these is of an obsidian.

The cores are from 10 to 13 cm. long, and from 2.5 to 3 cm. at the greatest thickness. They are roughly spindle-shaped (Fig. 1), with the greatest width near the middle in some of them, but near one end in

[1] Received November 4, 1921.

others. The ends are not sharply pointed, but are broken cleanly across. The cores are bounded laterally by 8 to 10 curved, narrow faces, produced by the perfect conchoidal fracture of the material, and nearly all these faces extend the whole length of the core. These narrow faces are slightly concave across their width.

The obsidian is of a uniform, jet-black color, perfectly vitreous, and with perfect conchoidal fracture. There are no streaks, and no phenocrysts are visible. In splinters the glass is brownish and very transparent. The thin section shows a clear colorless glass, homogeneous and with little or no evidence of flow. There are no bubbles but some very minute microlites are scattered sparsely through the glass; the larger (0.01 mm.) being irregular crystal fragments of pyroxene, and the smaller (0.001 mm.) opaque grains of magnetite. Their total percentage cannot amount to more than about 0.01 of the rock.

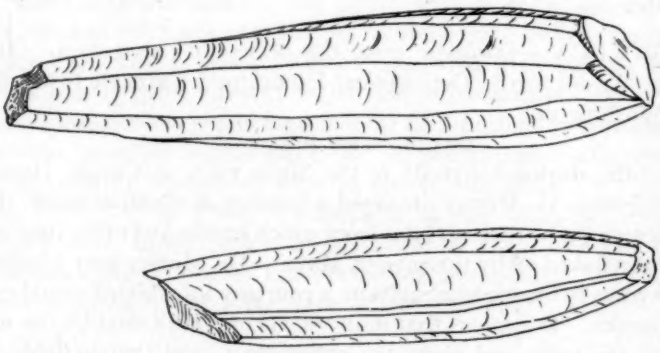

Fig. 1. Obsidian Cores from Copan.

Dr. H. E. Merwin very kindly determined the refractive indices, these being measured on a specially ground prism. They are as follows: $n_C = 1.4896$, $n_D = 1.4920$, $n_F = 1.4976$, and $n_{G'} = 1.5022$. It will be seen that the value for yellow light (D) is slightly higher than the indices (determined by Merwin) of the obsidians of Lipari (Rocche Rosse = 1.488–9, Forgia Vecchia = 1.490), Monte Arci (1.487–9), and Milos (1.490).[2] The first three have about the same percentage of silica as the Copan obsidian, but are slightly more potassic and with less lime; while that of Monte Arci is higher in silica by about 2 per cent, with a little less soda, but about the same

[2] H. S. WASHINGTON. Amer. Journ. Sci. 50: 462. 1920.

percentages of potash and lime. These observations are in conformity with the general rule, that silica and alkalies tend to lower, and lime tends to raise, the refractive indices of obsidians.

The specific gravity, determined with the balance on a piece weighing about 31 grams, is 2.372 at 23.2°C., giving a density of 2.366.

TABLE 1

ANALYSES OF OBSIDIAN

	(1)	(2)	(3)	(4)
SiO_2	74.46	76.68	75.23	75.64
Al_2O_3	13.13	14.49	12.36	12.68
Fe_2O_3	0.49	n.d	0.96	1.07
FeO	1.03	1.09	1.24	n.d
MgO	0.29	0.84	0.01	trace
CaO	1.25	1.53	1.00	0.83
Na_2O	4.52	3.92	4.00	4.98
K_2O	4.37	1.20	4.62	3.51
H_2O+	0.10	0.36	0.73	1.58
H_2O-	0.03			
TiO_2	0.45	n.d.	n.d.	n.d.
P_2O_5	0.09	n.d.	0.27	n.d.
MnO	0.05	trace	n.d.	n.d.
	100.26	100.11	100.42	100.29

(1) Obsidian, Copan, Honduras. WASHINGTON analyst.

(2) Obsidian, Corinto, Nicaragua. J. PETERSEN analyst. J. PETERSEN. Neues Jahrb. **1898: II**, 157.

(3) Obsidian, Cerro de los Navajos, Mexico. F. BAERWALD analyst. C. A. TENNE. Zeitschr. deutsch. geol. Ges. **37**: 616. 1885.

(4) Obsidian, Cerro de los Navajos, Mexico. F. BAERWALD analyst. C. A. TENNE. *Loc. cit.*

Chemical analysis gave the results shown in No. 1 of table 1, analyses of obsidians from Nicaragua and Mexico being given for comparison. In chemical composition the Copan obsidian closely resembles many others from widely separated localities, as may be seen by reference to U. S. Geological Survey, Professional Paper 99, pages 113 to 151. Its norm is as follows, represented by the symbol I.4. 1 (2).3(4).

Quartz	28.86	Diopside	2.75
Orthoclase	26.13	Magnetite	0.70
Albite	38.25	Ilmenite	0.91
Anorthite	2.22	Apatite	0.30

The Corinto (Nicaragua) obsidian, which is the only other Central American obsidian of which we have an analysis, is higher in silica and with lower alkalies, the soda greatly dominating over potash. One of the analyses of the Mexican obsidian is like that of Copan, but none of the analyses cited can be regarded as quite satisfactory.

It is probable, however, that the Copan obsidian is much like the general run of Central American and Mexican obsidians, if we may judge from analogy with similar regions in the western United States and along the Andes, a comagmatic zone to which the volcanic rocks of Mexico and Central America belong.

OBSIDIAN FROM CHICHEN ITZA

Among a large accumulation of sacrificial offerings (mostly of jade) found some years ago in a *cenote*, or natural well, at the ancient Maya city of Chichen Itza in Yucatan,[3] were a few beads of obsidian.

The beads are cylindrical, from 2 to 5 cm. long and about 5 mm. thick, with a shallow groove running spirally around them from end to end. The smooth but unpolished surface is brownish black, with irregular streaks of scarlet, which appear to be painted or burnt into the surface, as the color does not extend into the material below. They are apparently intended to simulate similarly mottled obsidians, which are fairly common, but discussion of this question of technique will be taken up elsewhere.

The obsidian is of a somewhat peculiar hair-brown color, quite different from the more usual brown of the Copan obsidian, but is colorless in thin section. It contains some bubbles, which vary in length from 0.02 to 0.10 mm. These are mostly spindle- or pear-shaped, the former frequently with one end drawn out to a sharp point. The bubbles are arranged in streaks, evidence of flow texture. Apart from these bubbles, the glass is perfectly clear and contains no microlites or phenocrysts.

Dr. Merwin determined the refractive index of this obsidian by the immersion method, and I would express my thanks to him for his kindness in making this and the other determinations on the Copan obsidian. He found the value $n_D = 1.489 \pm 0.001$. This is notably lower than the refractive index of the Copan obsidian, but is about the same as the indices for the Lipari and Milos obsidians. It is in accord with the rather high silica and alkalies and low lime and alumina.

The density was not determined, because the small amount of material available and the presence of the bubbles would have made the determination of little value.

[3] This collection, now in the Peabody Museum in Cambridge, Massachusetts, is to be described under the editorship of Prof. A. M. Tozzer, to whom I am much indebted for the privilege of studying the stone objects and publishing the present description, which deals only with the petrological aspects of the obsidian.

TABLE 2

ANALYSES OF PANTELLERITE OBSIDIAN AND COGNATE ROCKS

	(1)	(2)	(3)	(4)
SiO_2	75.88	72.21	70.14	74.09
Al_2O_3	9.67	9.72	8.61	10.88
Fe_2O_3	2.23	3.26	6.01	3.35
FeO	0.83	1.07	2.73	0.42
MgO	0.21	0.29	0.20	0.30
CaO	0.72	0.82	0.45	0.16
Na_2O	5.13	4.42	5.44	4.56
K_2O	4.56	4.98	4.20	4.45
H_2O+	0.38	1.96	0.35	1.52
H_2O-		0.24	0.17	
TiO_2	0.10	0.62	0.86	n.d.
ZrO_2	n.d.	n.d.	0.14	n.d.
P_2O_5	n.d.	0.10	0.12	n.d.
SO_3	n.d.	n.d.	0.06	n.d.
MnO	trace	0.05	0.38	n.d.
	99.71	99.74	99.86	99.73

(1) Obsidian bead, Chichen Itza, Yucatan. WASHINGTON analyst.

(2) Comendite, Cuddia Nera, Pantelleria. WASHINGTON analyst. H. S. WASHINGTON. Jour. Geol. **21:** 697. 1913.

(3) Pantellerite, Monte San Elmo, Pantelleria. WASHINGTON analyst. H. S. WASHINGTON. *Op. cit.*, p. 703.

(4) Comendite, San Pietro, Sardinia. A. JOHNSEN analyst. A. JOHNSEN. Abh. preuss. Akad. Wiss. **1912:** 22.

A chemical analysis, incomplete because of paucity of material, gave the results shown in No. 1 of table 2. In the figures for silica, magnesia, and the alkalies, it is much like the analysis of the Copan and other common obsidians, but is somewhat lower in lime and titanium. In its low alumina and rather high ferric oxide (especially as compared with ferrous oxide), however, it differs widely from most obsidians, and shows close analogies with the more silicic pantellerites and comendites, as may be seen by comparison with the other analyses given in the table.

The alumina is, indeed, so low that there is a notable excess of soda and potash over the total amounts of alumina and ferric oxide, so that the norm contains, not only considerable acmite, but some of the sodium metasilicate molecule.

The close analogy of the Chichen Itza obsidian with the peculiar rocks of the Italian volcanoes will be evident, and the obsidian may properly be called a hyalo-pantellerite, the glass of which is also brown. The occurrence of such a lava within the area from which the votive offerings may be supposed to have come is an unexpected one. Lavas

TABLE 3

NORMS OF PANTELLERITE OBSIDIAN AND COGNATE ROCKS

	(1)	(2)	(3)	(4)
Quartz	35.34	31.14	27.60	31.32
Orthoclase	27.24	29.47	25.02	26.69
Albite	24.10	22.01	20.44	30.92
Acmite	6.47	9.24	17.56	6.93
Sodium metasilicate	2.68	1.10	1.34	none
Diopside	3.10	2.57	1.21	0.65
Hypersthene	0.23	0.46	4.10	0.50
Magnetite	none	none	none	1.39
Ilmenite	0.15	1.22	1.67	none
Apatite	none	0.34	0.34	none

(1) Obsidian, Chichen Itza. (I) II. 3″.1.3.
(2) Comendite, Pantelleria. (I) II. (3) 4.1.3.
(3) Pantellerite, Pantelleria. II. 3(4). 1.3.
(4) Comendite, Sardinia. I (II). (3) 4.1.3.

of these types are rather rare and are invariably connected with characteristically sodic comagmatic regions. We know of no such sodic region in or near Central America or in southern Mexico, the nearest being the locality of nephelite syenite, in the State of Tamaulipas,[4] in northeastern Mexico. The lavas here, however, are apparently dacite, andesite, and basalt, Finlay mentioning no highly sodic lavas, such as phonolite or pantellerite. There are occurrences of pantellerite and other sodic lavas in western Texas, and I have pointed out elsewhere the probable existence of a zone of sporadic occurrences of sodic rocks along the eastern border of the North American continent, and that it probably continues down along the east coast of South America.

As has been said above, we know very little of the volcanic rocks of Central America, or of Mexico, for that matter, so it is quite possible that another isolated district of sodic rocks occurs in southern Mexico or northern Central America. The finding of these beads made of pantellerite obsidian in the Chichen Itza *cenote* gives warrant for this belief, which is further strengthened by the abundance of jade objects found in this general region, the material of which may be considered of Mexican or Central American provenance.

It would seem to be clear, from the descriptions above, that the Chichen Itza obsidian is derived from a volcanic source quite distinct and, we may reasonably suppose, far distant from that of the Copan cores. The occurrence of two such widely different obsidians, one of which belongs to a chemically very peculiar kind of rock, serves

[4] G. I. FINLAY. Ann. N. Y. Acad. Sci. 14: 247. 1904.

to emphasize the desirability, for archaeological as well as for petrological reasons, of a better knowledge of the volcanic rocks of Central America and Mexico.

ENTOMOLOGY.—*On the Orthopterous group Phaneropterae (= Scudderiae), with descriptions of a new genus and species.*[1] A. N. CAUDELL, Bureau of Entomology.

The genus *Phaneroptera* was erected by Serville in 1831,[2] with two originally included species, *Locusta lilifolia* Fabr., and *Locusta curvicauda* DeGeer. The only designation of genotype for this genus, so far as now known to the writer, was by Kirby in 1906,[3] when the *Gryllus falcatus* of Poda was so indicated. In his treatment of this matter Kirby followed Brunner in considering the *Locusta lilifolia* included by Serville as being a misdetermination, the real species being presumably the *Gryllus falcatus* of Poda. But, when an author names a particular species as originally included in a genus that species is presumed to be correctly determined, the sane and only rational reasoning applying, it seems, as in the case of genera based wholly on a misdetermined species, and covered by opinion No. 65 of the International Code of Nomenclature and by paragraph No. 96 of the Entomological Code. Thus the Fabrician *lilifolia* included by Serville in his genus is not to be considered a misidentification, and is eligible for genotype citation. The designation by Kirby of the non-included species *falcatus* being invalid the genus *Phaneroptera* is therefore as yet without a designated genotype, and one of the two originally included species, *lilifolia* and *curvicauda*, must be selected as the type. The first of these species, *Locusta lilifolia* Fabr., is the genotype of the monobasic genus *Tylopsis* of Fieber, 1858. The second species, *Locusta curvicauda* DeGeer, is the type of the genus *Scudderia* of Stal 1873, by original definite designation and by virtue of being the sole species of that monobasic genus. Now paragraph 98a and 101 of the Entomological Code and opinion 6 of the International Code restrict one to the selection of *curvicauda* as genotype, which I hereby do by definitely designating *Locusta curvicauda* DeGeer as the genotype of the genus *Phaneroptera* of Serville. This selection, being in accord with both recent codes governing such matters, can scarcely fail to meet with the approval of most nomenclatorialists.

[1] Received October 21, 1921.

[2] Ann. Sci. Nat. 22: 158.

[3] Syn. Cat. Orth. 2: 434.

From the above it is clear that Stal's genus *Scudderia* must fall as a synonym of *Phaneroptera* Serville, having the same genotype and being more recent by almost two decades. This leaves the species listed under *Phaneroptera* by Kirby[4] (except *attenuata* Walk., *marginalis* Brunn., and *annulata* Brunn., as noted below) without valid generic assignment. For these species and *grandis*, *nakoensis* and *tympanalis* M. & S., I propose the new generic name *Anerota*, with *Gryllus falcatus* Poda as the designated genotype.
The synonymy is as follows:

Anerota Caudell, nom. nov.

Phaneroptera Brunner (not Serville), Monogr. Phaneropt. 23, 209. 1878.
Phaneroptera Kirby (not Serville), Syn. Cat. Orth. **2:** 424. 1906.

The writer sincerely regrets these changes, the sinking of an old and well-known American genus and the introduction of a new generic name to replace an older one. However, such acts, being based on sound nomenclatorial grounds, are necessary if we attempt to comply with codified rules. And, as therein lies our only hope for an ultimately stable nomenclature, the sooner such changes are wrought the better.

The type of *Phaneroptera attenuata* Walker is in the British Museum, where it was studied by the writer in 1913. It is a female in poor condition, the abdomen being missing and the rest of the insect glued on a card. Most of the parts used in classification were, however, well preserved and prove that the species was wrongly placed by Walker and Kirby. It has conchate foramina and belongs to the genus *Tylopsis*, where it is a synonym of the older species *T. bilineolata* Serville. *Phaneroptera marginalis* Brunn. was described from an imperfect female, the anterior and intermediate legs being wanting. Kirby assumed the character of the missing parts to be the same as in Walker's *attenuata* and so synonymized it under that species. It seems probable that in this Kirby was correct, and the synonymy is as follows:

TYLOPSIS BILINEOLARIS Serville, Orth., p. 419. 1839.

Phaneroptera attenuata Walker, Cat. Derm. Salt. Brit. Mus. **2:** 338. 1869.

–*Phaneroptera marginalis* Brunner, Monogr. Phaneropt. 210, 214. 1878.

[4] Syn. Cat. Orth. **2:** 434–437 and **3:** 574.

Phaneroptera annulata Brunn. has been made the type of the genus *Xenodoxus* of Carl, described in 1914, thus eliminating it from other generic assignment.

Inscudderia, genus nov.

This is a member of the group Phaneropterae (= Scudderiae), but tends towards the Insarae, standing between the genera *Phaneroptera* (= *Scudderia*) and *Insara*, hence the generic name *Inscudderia*. Superficially it resembles *Insara*, especially *I. elegans*, but structurally it seems more like *Phaneroptera*, though in this respect also it tends towards the Insarae, especially in the narrow tegmina with their slightly concave caudal margins, two or more branched radial sectors and variegated color, and the longer and more slender legs. The greatly prolonged and non-style bearing subgenital plate of the male, the fastigium of the vertex failing to meet that of the face, the slightly spinose genicular lobes and the non-sellate pronotum exclude it from the Insarae. In the group Phaneropterae (= Scudderiae) this genus runs out in Brunner's keys, Monogr. Phaneropt., to *Scudderia* on page 16 except that the fore and middle femora are slightly toothed ventrally, which is also often true of the anterior femora of *Scudderia*, or *Phaneroptera*, as we have above shown this American genus must now be called. But there are various characters for the ready separation of this new genus from that older one, the more prominent ones being the twice or more branched radial sector, the more slender and posteriorly slightly concave tegmina, the comparatively longer and more slender legs, the more rounded lateral carinae of the pronotum with the posteriorly flattened disk of the same, the ventrally subspinose intermediate femora and the more decidely armed ventral margins of the posterior femora.

Description.—(♂, the ♀ unknown). Head with the fastigium of the vertex very narrow, not exceeding a fourth the width of the basal segment of the antenna, subhorizontal and failing to meet the frontal fastigium, the presenting face rounded; eyes almost round, prominent. Pronotum rounding into the lateral lobes without distinct lateral carinae except in the posterior fourth, where the disk, which is otherwise gently convex, is wholly and conspicuously flattened, and there the lateral carinae are sharp and distinct; lateral lobes about equally high as long, the humeral notch deep.

Organs of flight fully developed; wings hyaline with the tips, which project beyond the closed tegmina a distance approximately equal

to the pronotal length, green, especially in the costal area where it is coriaceous like the tegmina; tegmina narrow, slightly over five times as long as broad, at the widest point being very slightly broader than the pronotal length, the posterior margin barely concave; first radial branch two or three forked and joined near the base to the ulnar vein by a diagonal cross vein. Legs slender, the posterior femora just reaching the tips of the closed tegmina; spine of anterior coxa long and sharp; anterior tibiae with open foramen on each face; all the tibiae sulcate dorsally and armed on both ventral margins with several black spines of moderate size; above the intermediate and posterior tibiae also bear sharp black spines on both margins, only one to three on the cephalic margin of the middle ones, and on that margin there is no apical spine, as there is on the opposite margin and on both margins of the hind tibiae; anterior tibiae wholly unarmed on the dorso-cephalic margin, the opposite margin with a basal spine (often very small) near the lower margin of the foramen, a terminal spine and from one to three additional ones at irregular intervals between the above; posterior femora armed beneath on both margins with several black triangular teeth, the fore and middle ones with from none to two very minute teeth on the caudal margin beneath and the anterior ones may have one or two exceedingly minute teeth on the ventro-cephalic margin; posterior genicular lobes very briefly but acutely pointed, the others rounded.

Abdomen with the segments evenly truncate except the terminal one, which is slightly prolonged and apically broadly notched, as shown in figure 1, *c;* subgenital plate greatly prolonged and upcurved, as in *Phaneroptera* (= *Scudderia*), without apical styles but the latero-apical angles roundly tubercular, the apex notched; supraanal plate elongate-triangular, deeply concave above; cerci heavy, about twice as long as the last dorsal segment of the abdomen, subcylindrical, tapering moderately to about the middle and then again growing stouter to the noticeably swollen apex, where there is a heavy, sharply pointed and inwardly directed tooth about a third as long as the body of the cercus. (See fig. 1, *b* and *c*.)

Type *Inscudderia taxodii*, sp. nov.

Inscudderia taxodii, sp. nov.

This is undoubtedly one of the most distinct species of Orthoptera, and that such a striking katydid inhabiting the southeastern United States should so long escape notice is indeed remarkable.

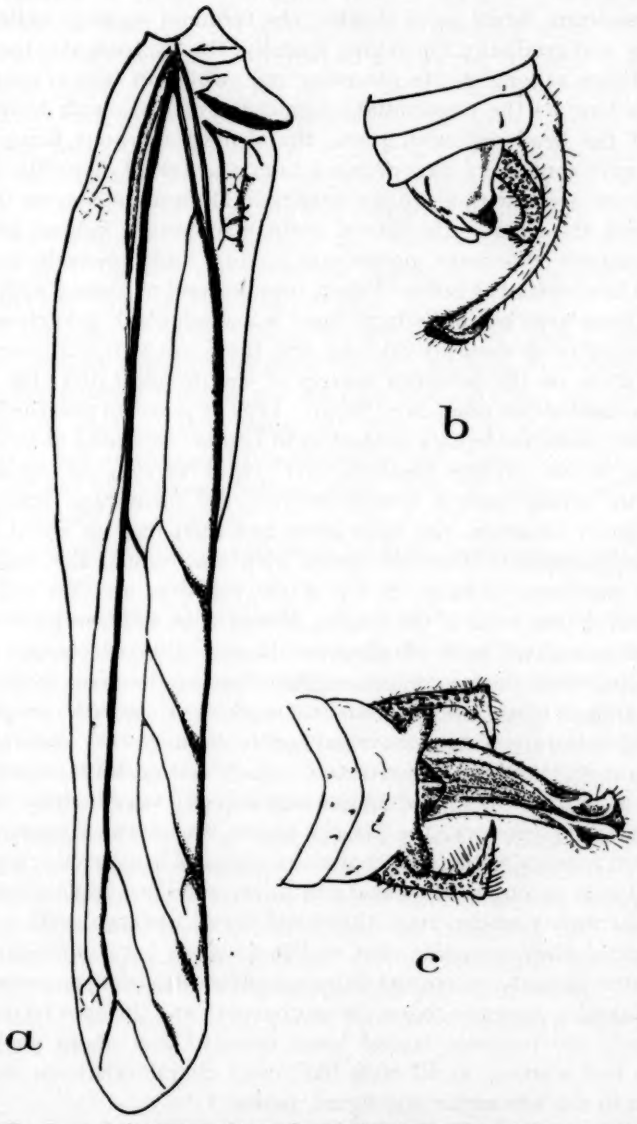

Fig. 1. *a*, Left tegmen of type; *b*, end of abdomen, lateral view; *c*, end of abdomen, dorsal view. Figures by Dr. A. BOWING.

Description.—(♂, the ♀ unknown). Head slightly broader than the pronotum; labial palpi slender, the terminal segment cylindrical, slightly and gradually thickening apically, the tip truncate, the whole three times as long as the preceding one, which in turn is about one-half as long as the penultimate segment; eyes yellowish brown, the rest of the head yellowish green, the slender antennae being darker green with some very narrow black bands scattered along the length. Pronotum green with a narrow longitudinal mesial stripe on the disk and with the cites of the lateral carinae somewhat lighter; pronotal disk truncate anteriorly, posteriorly broadly and uniformly rounded; lateral lobes with the humeral sinus rounded and margined with black, the callous large but indistinct; there is a small black splotch anterior of the center of each lateral lobe and there are two small transverse black spots on the posterior margin of the pronotal disk, the mesial longitudinal stripe separating them. Legs as noted in generic description, the posterior femora shaped as in *Insara;* foramina of fore tibiae shining black. Wings slender, over twice as long as broad, the posterior apical margin evenly curved, the membrane transparent with green venation, the apex green and thickened as noted in the generic diagnosis. Tegmina green with the radius, the anal vein, which continues to near the tip of the tegmina, and the heavier of the stridulating veins of the singing area piceous and a series of several conspicuous short, pointed, diagonal, basally directed piceous streaks extending from the posterior margin, following the veins as shown in fig.1, *a;* these black veins and diagonal markings show very conspicuously against the greent egmina, imparting to them a very characteristic appearance. Abdomen moderately heavy; last dorsal segment about twice as long as the preceding one and apically very broadly notched and laterally concave, the lateral angles thus formed appearing as rounded tubercular-like protuberances, as shown in figure 1, *c*, supraanal plate twice as long as the basal width, the sides straight and tapering to a narrowly rounded apex, the entire dorsal surface deeply concave; subgenital plate very like that of *Phaneroptera* (= *Scudderia*), being a narrow elongate, upcurved flattened plate with conspicuously thickened margins, concave above, convex beneath and the apex triangularly notched, the terminal lateral lobes rounded and about as long as thick, but scarcely at all style-like; cerci characteristic in shape, as shown in the accompanying figure, figure. 1.

The immature form shows little essential difference from the adult except that the colors show evidence of the same brilliantly hued

variegation as exhibited by some of our species of *Phaneroptera*, though the second segment of the antenna does not show such conspicuous enlargement as is present in the young of some species of the latter genus. The legs are dotted with black and the posterior femora have some larger black markings on the upper surface and on the outer face; the abdomen is ornamented with numerous short narrow red dashes, the lateral lobes of the pronotum are centrally reddish with yellowish lower margin and with some black markings. The pronotal disk of the nymphs, at least the only two examined, does not show the absolute flattening of the posterior fourth as is so conspicuously true of the adult form.

Measurements of adult.—Length, pronotum, 4 mm.; tegmina, 21 mm.; posterior femora, 20 mm. Width, tegmina at widest point, 4 mm.; pronotum across the posterior flattened portion, 2.3 mm.

Type, ♂, Durant, Miss., July 15, 1921. C. J. Drake, collector; paratypes, one adult ♂ and two immature ♂♂, one nearly full grown and one about half grown, Pickens, Miss., July 16, 1921, taken by the same collector.

Type and paratypes in collection of the United States National Museum.

Catalog No. 24952, U. S. N. M.

In addition to the above four specimens Prof. Drake distinctly recalls having seen specimens, adults and nymphs, at the following localities in Mississippi: Fulton, Columbus, Vicksburg, Natchez and Port Gibson. Not realizing their interest and importance he unfortunately kept but the above described specimens, though many, he says, might easily have been secured.

Prof. Drake, who is to be congratulated on the discovery of this unusually interesting addition to our native orthopterous fauna, found this beautiful little katydid to occur quite common on cypress, where he often took them while beating the foliage of that tree for Hemiptera. He also on one occasion swept a few adults from weeds and grass in the immediate vicinity of cypress. The adults aroused his interest by the nicety with which their colors blended with those of the host plant.

ABSTRACTS

Authors of scientific papers are requested to see that abstracts, preferably prepared and signed by themselves, are forwarded promptly to the editors. The abstracts should conform in length and general style to those appearing in this issue.

GEOLOGY.—*Contact-metamorphic tungsten deposits of the United States.* FRANK L. HESS and ESPER S. LARSEN. U. S. Geol. Surv. Bull. **725-D.** Pp. 65(245–309). 1921.

Contact-metamorphic tungsten deposits have been formed through the combined action of the heat and solutions emanating from a cooling intrusive granitic magma on limestones and the other intruded rocks and to a less extent on the invading granitic rock itself, by which the rocks are altered to or replaced by an aggregate of garnet, epidote, diopside, quartz, calcite, scheelite, and other minerals. Most deposits of this class are at or very near the contacts, and they clearly represent replacement of the limestones and other rocks. The tungsten mineral of such deposits is invariably scheelite.

Most of the known contact-metamorphic tungsten deposits in the United States are in the Great Basin region in California and Nevada and northwestern Utah, but Oregon, Arizona, and New Mexico are known to contain one deposit each, and it is probable that other such deposits will be found in widely different parts of the country.

The geologic features of contact-metamorphic deposits and the causes of metamorphism are discussed. Most of the paper is made up of a brief preliminary description of the contact-metamorphic scheelite deposits in the western United States. R. W. STONE.

GEOLOGY.—*Chrome ores in Pennsylvania, Maryland and North Carolina.* ELEANORA BLISS KNOPF and J. VOLNEY LEWIS. U. S. Geol. Surv. Bull. **725-B.** Pp. 55 (85–139). 1921.

Chrome ore was discovered in Maryland as early as 1827. Until 1860 Maryland and Pennsylvania furnished the world's supply of chrome ore, but in 1860 the chief source of the world's supply was transferred to Turkey. Since 1882 practically all of the output of chrome ore in the United States has come from the Pacific coast, and the industry in the Eastern States has lain dormant.

The chromite is found in rock ore and in alluvial sand. The rock ore is both massive and granular. It occurs in serpentinized pyroxenites and peridotites that probably represent ultrafemic differentiates of a gabbro intrusion. The massive ore occurs in pockets of variable size. The ore occurs at intervals in a belt 50 miles long that extends from the southwest corner of Chester County, Pa., to the neighborhood of Baltimore, Md. It has probably originated by the sinking of chromite grains during the crystallization of a highly magnesian magma.

The chrome ores of North Carolina occur in granular olivine rocks (peridotites), which form numerous small isolated outcrops in a belt 5 to 25 miles wide throughout the mountainous western part of the State, a distance of 200 miles.

This report describes the character of the rocks and their hydration and decomposition products, also the character and classification of the chrome ores and the nature of the gangue minerals.

The chrome ores are believed to have been formed by the local concentration of suspended grains and crystals of chromite during the cooling of the molten peridotite magma after its intrusion into the gneisses. Convectional circulation was probably the chief agent in the process. The chance of large bodies of deeper-seated ore having been formed at the same time is thought to be very small. R. W. STONE.

BIOLOGY.—*A new classification of animals.* AUSTIN H. CLARK. Bulletin de l'Institut Océanographique (Monaco), No. 400, pp. 1–24. 20 September, 1921.

This paper is an amplification of the short note on the steps in the evolution of animals published in this JOURNAL,[1] and also includes a consideration of the corresponding steps in the evolution of plants. A key is given to all of the animal phyla, in which the larger plant groups are also included, and finally there is a list of the phyla and higher groups accepted by the author. Several of the higher groups and one of the phyla (Calyssozoa) are here proposed for the first time. A. H. C.

ENTOMOLOGY.—*Dispersion of flies by flight.* F. C. BISHOPP and E. W. LAAKE. Journ. Agric. Res. **221:** 729–766. 1921.

This paper discusses the dispersion of flies by flight and experiments listed and described show that under rural and urban conditions many species of flies have marked powers of diffusion. The house fly spread a maximum distance of 13.14 miles from the point of release. It is noted that the species tested often pass feeding and breeding grounds and from the experiments there are certain facts which indicate that they have marked migratory habits. The relation of the direction of dispersion and the direction of the winds is discussed and it is stated that no correlation could be determined because when the experiments were conducted the wind conditions were considered as choppy. The evidence gained by the experiments justifies the conclusion that passing vehicles on highways are not a dominating factor in the dispersion of the flies used. There is no marked difference between the dispersion of males and females. The facility with which flies travel many miles emphasizes the importance of the general application of sanitary measures looking toward the suppression of fly breeding. S. A. ROHWER.

ORNITHOLOGY.—*A new ptarmigan from Mount Rainier.* W. P. TAYLOR. Condor **22:** 146–152. 1920.

A new ptarmigan from Mount Rainier is here named *Lagopus leucurus rainierensis.* HARRY C. OBERHOLSER.

ORNITHOLOGY.—*Waterfowl in Nebraska.* H. C. OBERHOLSER. Bull. U. S. Dept. Agric. **794:** 2–35. 1920.

The principal waterfowl breeding ground in Nebraska is the sandhill region, which occupies the middle portion of the State. The most important groups of lakes are those of eastern Cherry County, Brown County, Garden and Morrill Counties, and those at the head of the North Loup River. All these

[1] This JOURNAL **11:** 207–208. May 4, 1921.

lakes are relatively small and shallow, and many are more or less ephemeral. The water in most is fresh, but in a few is alkaline.

Notes on habits, occurrence, and distribution of 56 species of water birds are here given, 42 of which are breeding species of the State, and 14 are only autumn transients. The most abundant breeding duck is *Querquedula discors*.

H. C. O.

ORNITHOLOGY.—*Observations on the habits of the white-winged dove.* ALEXANDER WETMORE. Condor **22:** 140–146. 1920.

The habits of *Melopelia asiatica mearnsi* as observed near Arlington, along the Gila River in Maricopa County, Arizona, present some interesting features. The species were found breeding in colonies, some of them as large as 2000 pairs. The young are fed by regurgitation for three or four days, after which they are given fresh food. They remain in the nest three or four weeks. A regular morning flight from the breeding colonies begins an hour after sunrise and continues until nearly noon of each day. The species feeds much on wheat and barley, but as most of this is waste grain, the damage to the cultivated crops of the region is comparatively slight.

H. C. O.

ORNITHOLOGY.—*Observations on the habits of birds at Lake Burford, New Mexico.* ALEXANDER WETMORE. Auk **37:** 221–247, 393–412, pls. 1–7. 1920.

Lake Burford lies at an altitude of 7000 feet in the northwestern part of New Mexico. The observations here recorded relate to 105 species, and include sometimes extended notes on habits, particularly of the water birds.

H. C. OBERHOLSER.

ORNITHOLOGY.—*A peculiar feeding habit of grebes.* ALEXANDER WETMORE. Condor **22:** 18–20. 1920.

The stomachs of grebes usually contain a considerable quantity of feathers. These are eaten by the birds during the process of preening. Although these feathers are eventually ground up and enter the intestines, a plug of them remains in the pyloric lobe of the stomach, apparently serving as a strainer to prevent the passage of the more indigestible parts of food eaten.

H. C. OBERHOLSER.

ORNITHOLOGY.—*A new cliff swallow from Canada.* H. C. OBERHOLSER. Canadian Field-Nat. **33:** 95. 1920.

The form of *Petrochelidon albifrons* inhabiting most of western Canada is here described as *Petrochelidon albifrons hypopolia*. It is the largest of the races of *Petrochelidon albifrons*, and inhabits northwestern North America, from Mackenzie and Alaska, south to Montana and Alberta, migrating through the western United States probably to South America. H. C. O.

ORNITHOLOGY.—*Description of a new clapper rail from Florida.* H. C. OBERHOLSER. Proc. Biol. Soc. Wash. **33:** 33–34. 1920.

A clapper rail from the Florida Keys is described as *Rallus longirostris helius*. H. C. O.

ORNITHOLOGY.—*The migration of North American birds. XIII. European Starling and the Bobolink.* H. C. OBERHOLSER. Bird Lore **22:** 213–216. 1920.

The European Starling (*Sturnus vulgaris vulgaris*), was introduced into the

United States about 1890. Since that time it has spread into Maine, central New York, Pennsylvania, West Virginia, and southeastern Virginia, where it now breeds. It has wandered also to Ohio, Alabama, and Georgia, and probably will continue to spread into suitable areas in the eastern United States. The well-known Bobolink (*Dolichonyx oryzivorus*), breeding in North America, migrates to winter in Bolivia and Argentina. Tables of dates of its spring and fall migration are here given. H. C. O.

ORNITHOLOGY.—*A synopsis of the races of the Guiana flycatcher,* Myiarchus ferox (*Gmelin*). H. C. OBERHOLSER. Proc. Indiana Acad. Sci. **1918:** 304–308. 1920.

Eight subspecies of this bird are here recognized, one of which has not heretofore been regarded as distinct. H. C. O.

ORNITHOLOGY.—*Description of a new* Otocoris *from California.* H. C. OBERHOLSER. Condor **22:** 34–35. 1920.

The breeding horned lark of the northern Sierra Nevada in California is here named *Octocoris alpestris sierrae.* H. C. O.

ORNITHOLOGY.—*Fifth annual list of proposed changes in the A. O. U. check-list of North American birds.* H. C. OBERHOLSER. Auk **37:** 274–285. 1920.

This list includes the changes in nomenclature and status of North American birds proposed during the calendar year 1919. It comprises the addition of 7 genera, 8 species, and 16 subspecies; together with 67 changes in generic, subgeneric, specific, and subspecific terms, involving altogether 90 names. Furthermore, there are 14 eliminations from the North American list as now understood, these consisting of 7 genera, 1 species, and 6 subspecies. H. C. O.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

PHILOSOPHICAL SOCIETY

853D MEETING

The 853d meeting of the Philosophical Society of Washington was held in the Assembly Hall of the Cosmos Club October 8, 1921. It was called to order by President FARIS with 44 persons present.

The first paper of the evening, on *A furnace temperature regulator,* was presented by Mr. H. S. ROBERTS, 3D, and was illustrated. It was discussed by Messrs. PAWLING, WHITE, L. H. ADAMS, and others.

This paper was a description of a thermo-regulator for use with electric resistance furnaces and an account of its operation.

The apparatus is a modification of the regulator described by White and Adams in 1919, in which the heating coil of the furnace is placed in one arm of a Wheatstone bridge and the supply of energy to the furnace varied in a single step by means of a switch operated by the galvanometer of the bridge. In the White-Adams apparatus the switch was moved by a motor-driven mechanism and could only open or close at particular instants separated by arbitrarily fixed intervals of about one second. In the present regulator

the switch is operated by an electro-magnet as soon as a contact button on the boom of the galvanometer reaches one or the other of two fixed contact buttons. As the force with which the galvanometer presses the contact buttons together is very small, it is necessary to employ only a very small current through its contacts, in order to prevent their sticking. For this purpose a high resistance polarized relay is placed between the galvanometer contacts and the magnet that operates the main switch. As a further precaution, the secondary of a small transformer is connected in series with the coil of the galvanometer, while the primary is connected to the heating circuit in such a way that the operation of the main switch causes a ballistic deflection of the galvanometer towards its central position. All the appliances used are of standard make with a few simple changes.

The adjustment of the rate at which energy is supplied to the furnace is effected by varying the ratio of the time it is supplied at a higher rate to the time it is supplied at a lower rate. Thus the present type of galvanometer is able to secure the proper ratio in a single cycle while the type employed by White and Adams could, in general, only approximate it after several cycles by a fraction whose numerator and denominator were integers. Under certain conditions this caused a rather large, slow oscillation of the temperature of the furnace.

In order to vary the temperature of the furnace slowly for taking heating or cooling curves, one of the arms of the bridge is shunted by a variable rheostat whose resistance is changed in equal steps at intervals of 30 or 60 seconds. This arrangement has been found to give a steady change of temperature, which, however, is not quite linear.

The regulator, when used with the ordinary type of platinum resistance furnace, has been found to hold the temperatures up to 1250° constant within 0.2° C. for several hours, in spite of variations of 5° in the room temperature and of 6 per cent in the line voltage. At higher temperatures the temperature falls slowly, but may be maintained within 0.2° by an occasional manual adjustment. The temperature coefficient of nichrome or chromel wire is too low for the regulator; but nickel wire may be used up to perhaps 500° and some other alloy, such as alumel, may be found to work at still higher temperatures. As is the case with the White-Adams regulator, this apparatus, in its present form, is not suitable for use with alternating current or with the pulsating current furnished by the mercury arc rectifier.

The second paper, on *Aerial navigation*, was presented by Mr. H. N. EATON, and was illustrated. It was discussed by Messrs. L. J. BRIGGS, LITTLEHALES, A. F. BEAL and PAWLING.

Aerial navigation is a recent development as it is only since aircraft have become capable of flying for long distances that the necessity for navigating them as ocean-going vessels are navigated has arisen. Aerial navigation resembles marine navigation in general principles but is more difficult in application owing to the higher speeds of the craft and of the supporting medium, to the impossibility of charting the winds as the ocean currents are charted because of the variability of the former, and to the fact that freedom of motion in three dimensions introduces additional problems. Fortunately it is not necessary to determine position as accurately in the case of air-craft as in the case of ships on the ocean, since an error of from 10 to 20 miles involves only a few minutes additional flying time.

There are three general scientific methods of aerial navigation; dead reckon-

ing, astronomical observation, and directional wireless telegraphy. Dead reckoning involves the measurement of air speed, ground speed, heading, drift, and the amount and direction of the wind. The chief difficulty in this method of navigation arises from the fact that the motion of the craft over the ground is due to the resultant of the air velocity of the craft and the effect of the wind, the latter being often difficult to determine. Instruments have been developed to measure directly or indirectly all of these quantities.

In general principles marine and aerial navigation by astronomical observations are practically identical. The sextant is the universal instrument used for observation on the celestial bodies in both cases. In the air, however, it often happens that no horizon is available to furnish a reference line and it is then necessary to use an artificial horizon of some type, bubble, pendulum, or gyroscopic. Consequently, sextants with these horizons attached are commonly used in aerial navigation. It is worthy of notice that the aerial navigator often has available natural horizons which are never visible from the surface of the sea. The top surface of the haze lying over the ocean and flat layers of clouds often furnish excellent horizons.

The radio direction finder can be used in the air to determine the position of the craft by measuring the directions in which radio waves from the craft reach two or more fixed stations or radio waves from the fixed stations reach the craft.

H. H. KIMBALL, *Recording Secretary.*

SCIENTIFIC NOTES AND NEWS

THE PUEBLO BONITO EXPLORATIONS

Mr. NEIL M. JUDD, curator of American archeology, U. S. National Museum, returned to Washington recently after having been occupied in New Mexico for more than five months as director of the National Geographic Society's Pueblo Bonito Expedition. Pueblo Bonito is one of the largest and best preserved prehistoric ruins north of Mexico. The Society has obtained a permit from the Department of the Interior and it is expected that the ruin can be wholly excavated within five years. No public notice has yet been issued as to the results of this first season's explorations but it is understood that the expedition was entirely successful both from the viewpoint of excavations actually completed and from the amount of data recovered.

A unique feature of this newest National Geographic Society expedition—one which has created considerable favorable comment among American men of science—is a proposed series of annual conferences at Pueblo Bonito to which specialists in the various humanistic sciences will be invited. The first of these symposiums, held last August, was attended by archeologists and agriculturists; geologists, botanists, and soil experts will be present at next year's meeting. The willing cooperation of these gentlemen—leaders in their respective fields of research—has made it possible to attack the problem presented by the marvelous ruins of Pueblo Bonito on a scale not thought possible heretofore; their combined efforts should result in a very distinctive contribution to the history of ancient America.

NOTES

The following lectures have been given recently in the Bureau of Standards Physics Club series on the physics of the Earth: Monday, October 31, WIL-

LIAM BOWIE: *The theory of isostasy;* Monday, November 7, HARRY FIELDING REID: *The causes of earthquakes;* Monday, November 14, LYMAN J. BRIGGS: *The measurement of the acceleration of gravity at sea.*

Captain ERNEST L. BENNETT, formerly in command of the battleship *New York*, has been designated by the Navy Department as director of the naval experimental and research laboratory now nearing completion at Belleview, on the Potomac River below Washington. Five buildings, including office and laboratory, machine shop, forge and foundry, pattern shop, and power plant, are under construction.

Dr. TORBJÖRN GAARDER, director of the biochemical laboratory of Bergens Museum, Bergen, Norway, visited the scientific institutions of Washington early in November.

The Directors of the American Chemical Society have elected Mr. H. E. HOWE, of the National Research Council, editor of the *Journal of Industrial and Engineering Chemistry* to succeed Dr. CHARLES H. HERTY, who has resigned to become president of the newly organized Association of Synthetic Organic Chemical Manufacturers.

Dr. WILLIAM C. KENDALL, scientific assistant and ichthyologist of the U. S. Bureau of Fisheries, has resigned after nearly thirty-three years of service with the Bureau, to accept the position of ichthyologist in the Roosevelt Wild Life Forest Experiment Station of the New York State College of Forestry, Syracuse, New York.

The collection of birds of the late WILLIAM PALMER has been transferred from George Washington University to the Division of Birds, U. S. National Museum. This collection is noteworthy for the number of District of Columbia records and for the young and molting plumages it contains.

Dr. GUSTAV TROEDSSON, paleontologist at the University of Lund, Sweden, and now traveling on a fellowship in the United States, spent a part of October in studying the Cambrian and Ordovician collections in the National Museum.

Mr. S. L. WILLIS, formerly in charge of the preparation of ceramic data for the U. S. Tariff Commission, has resigned to accept a position with the Corning Glass Works of Corning, New York.